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Development and acceptability testing of a Facebook smoking cessation intervention for sexual and gender minority young adults

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ABSTRACT

This study tested engagement in and acceptability of a digital smoking cessation intervention designed for young adults and tailored to sexual and gender minority (SGM) individuals. The intervention included 90 Facebook posts delivered in private groups tailored to readiness to quit smoking (Ready to quit in 30 days/Not Ready; 180 posts total; 101 posts SGM-tailored by content/image). Acceptability was evaluated over 30 days (3 posts/day). Participants' (N = 27) open-ended feedback was coded and tallied; posts with significant negative feedback were flagged for change. Flags and comment volume were examined by SGM tailoring (versus not tailored) and content category (motivational interviewing, experiential strategies, behavioral strategies, relevant topics). Engagement and acceptability were high. All participants reported viewing at least half of the posts, and the majority reported viewing all 90 posts (M comments per participant = 51.74). The majority of participants agreed or strongly agreed with statements about the intervention's helpfulness and clarity. Posts received an average of 8.08 comments (SD = 2.58), with 59 posts (32.8%) flagged for change. Posts engaged comments and were found to be acceptable at comparable levels regardless of SGM tailoring and content category (all p-values > .189). SGM young adult smokers were highly engaged in an SGM-tailored smoking cessation intervention on Facebook and rated the intervention positively. Both tailored and non-tailored Facebook posts in a variety of content areas were generally well-received by SGM young adults, an underserved population with high rates of smoking.

1. Introduction

Sexual and gender minority (SGM) individuals are more likely to smoke cigarettes than their non-SGM peers, with estimated smoking prevalence ranging from 27.4% for lesbian women to 36.6% for bisexual individuals (compared to 14.6%–20.2% for non-SGM individuals (Buchting et al., 2017; Hoffman et al., 2018; Emory et al., 2016)). Consequently, it is important to develop smoking cessation interventions that are well-received by and effective for SGM smokers. Previous research found that SGM smokers reported a preference for interventions tailored to the SGM community (Schwappach, 2009; Walls and Wisneski, 2011) and rated a tailored intervention as more acceptable than a non-tailored version (Matthews et al., 2018). As such, a tailored tobacco treatment intervention may be more engaging and acceptable than traditional interventions, thereby producing higher cessation rates.

Cultural tailoring of health-related messages and interventions involves designing them in a way that affirms a group's values, beliefs, and characteristics, using both surface-level tailoring (i.e., reflecting characteristics of the group, such as SGM individuals, couples, events, and symbols) and deep-level tailoring (i.e., incorporating cultural values, beliefs, and experiences, such as prejudice and discrimination, targeted advertising, and social norms (Resnicow et al., 2002)). Although there have been few SGM-tailored smoking cessation intervention trials, the extant literature suggests that such interventions offer great potential for engagement and quit rates (Dickson-Spillman et al., 2014; Eliason et al., 2012; Harding et al., 2004; Matthews et al., 2013). Additional tailoring, such as catering materials to a participant's readiness to quit smoking, is also highly effective (Strecher, 1999). As such, an SGM-targeted intervention with elements of personal tailoring may produce high engagement and quit rates.

Most smoking cessation interventions for SGMs have involved in-

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person smoking cessation classes tailored to subgroups of SGM individuals (e.g., gay men). These intervention formats may be less accessible to members of certain SGM subgroups (e.g., gender minorities) and SGM smokers in rural areas. SGM individuals who do not have a solid support system in their own communities may benefit from the opportunity to access services and communicate with other SGM individuals through a digital smoking cessation intervention. The majority of young adults (88%) have social media accounts and use them frequently (Pew Research Center, 2018). A digital intervention delivered on social media retains many of the benefits of traditional interventions, including social support and regular contact with experts in smoking cessation, while increasing accessibility and usability for young smokers.

In a previous study (Thrul et al., 2017), we found Facebook to be an effective medium for conducting focus groups with SGM smokers, which were used to inform SGM tailoring of a smoking cessation intervention delivered on Facebook. The goal of the present study was to test acceptability of and engagement in the Put It Out Project (POP), an SGM-tailored intervention, using a mixed-methods approach. Similar studies have been conducted for several other digital smoking cessation interventions tailored to specific populations of smokers, including pregnant women (Sloan et al., 2017), people with severe mental illness (Ferron et al., 2011; Ferron et al., 2017; Vilardaga et al., 2018), low-income women (McDaniel et al., 2002; Wen et al., 2014) and veterans (Duffy et al., 2013). Previous studies have obtained either qualitative (Sloan et al., 2017; Ferron et al., 2011; Ferron et al., 2017; Vilardaga et al., 2018; Houston and Ford, 2008) or quantitative (Ferron et al., 2017; McDaniel et al., 2002; Wen et al., 2014; Duffy et al., 2013) feedback from participants, with few studies integrating mixed methods. To our knowledge, this is the first study to use social media to test the acceptability of an SGM-tailored smoking cessation intervention for young adults.

2. Materials and methods

During a 30-day acceptability study, participants provided their responses to 90 Facebook posts and gave feedback on the design and content of the posts. Then, they completed a follow-up survey regarding their perceptions of the intervention. This research was approved by the University of California, San Francisco Institutional Review Board (study # 16-1855).

2.1. Intervention

The Put It Out Project (POP) intervention was adapted from the Tobacco Status Project (TSP), a smoking cessation intervention for young adult smokers delivered entirely on Facebook (Ramo et al., 2018a). Participants in TSP were assigned to private Facebook groups tailored to their readiness to quit smoking. Intervention content consisted of: 1) daily Facebook posts, on which participants were encouraged and incentivized to comment, and 2) weekly counseling sessions (“The Doctor Is In”), in which participants could chat with a trained smoking cessation counselor. Post content was based on the U.S. Clinical Practice Guidelines for smoking cessation (Fiore et al., 2008), the Transtheoretical Model (DiClemente et al., 1991), and motivational interviewing (MI). For those not ready to quit smoking, post content primarily elicited participants' motivation for change, anticipated barriers to change, and awareness of the risks of continuing to smoke. For those ready to quit, cognitive behavioral therapy (CBT) strategies were designed to help participants prepare to quit smoking (Ramo et al., 2015a; Ramo et al., 2015b).

POP is a version of TSP tailored for SGM young adults. Facebook posts for POP were developed by a diverse team of SGM and non-SGM individuals, based on findings from focus groups held with young adult SGM smokers on Facebook. In the focus groups, participants were prompted to reflect on their identities as SGM individuals and as smokers, their membership in SGM and online communities, and their thoughts on specific features of a tailored digital smoking cessation intervention (Ramo et al., 2018). Participant responses informed the topics of many tailored study posts (e.g., social support, coping with stress). Some posts were surface-level tailored, such as replacing an opposite-sex couple image with a same-sex couple. Other posts were deep-level tailored, such as addressing the tobacco industry's targeted advertising to the SGM community and the commonness of smoking in SGM social circles.

2.2. Recruitment and consent

Participants were recruited using a Facebook advertisement campaign targeting SGM young adult smokers (age 18–25) in the United States. Two ad sets were administered over ten days in April 2017 (Ramo et al., 2014). After clicking on an ad, participants were directed to an eligibility survey. Inclusion criteria were self-identification as SGM, age 18–25, history of smoking at least 100 cigarettes in one's lifetime, currently smoking at least 1 cigarette per day on 4 or more days per week, using Facebook “most” (≥ 4) days per week, able to read English, and a valid US zip code. To be eligible, participants needed to be willing to add the study's account as a “friend” on Facebook and to join a private Facebook group with other SGM smokers. Those eligible read the consent form and then were asked three questions to ensure study comprehension. Participants who answered the questions correctly were asked to provide electronic consent. Consented participants were asked to add the study's Facebook account as a “friend” to confirm their identity.

2.3. Procedure

Confirmed participants completed the baseline online survey on Qualtrics and then were invited to one of two private Facebook groups based on their readiness to quit smoking (Getting Ready: ready to quit in the next 30 days; Not Ready: all others) (Prochaska and DiClemente, 1983). Study staff posted 3 times per day in each Facebook group for 30 days. For each of the 90 posts, participants were asked to, 1) respond to the post itself (i.e., answer the question asked in the post), and 2) provide open-ended feedback about the design and content of the post through Facebook comments. These instructions were given at the beginning of the study, with periodic reminders. Two researchers were responsible for moderating the groups by replying to the comments, answering participants' questions, and encouraging participants to elaborate on feedback. After study completion (day 30), all data were extracted from Facebook and the two private groups were closed for participation. Participants were then sent a final Qualtrics survey that included a measure of their perceptions of the intervention content (described below). Comments were tallied, and participants who commented on more than half of the posts received a $25 Amazon gift card. Participants also received $25 gift cards for completion of each survey (baseline and follow-up), for total possible compensation of $75.

2.4. Baseline measures

2.4.1. Demographics

Demographics included gender identity, sex at birth, relationship status, sexual orientation, race/ethnicity, age, years of education completed, and employment status.

2.4.2. Smoking

The Smoking History Questionnaire (Hall et al., 2006) assessed the quantity and frequency of current smoking and age of first cigarette. The Fagerström Test of Cigarette Dependence (FTCD (Heatherton et al., 1991)) was used to assess nicotine dependence. Readiness to quit smoking was measured using the Stages of Change Questionnaire (Prochaska and DiClemente, 1983). These measures have demonstrated

reliability and validity for use with young adult smokers online (Ramo et al., 2013).

2.5. Post categories

Each Facebook post was classified on two different dimensions: 1) SGM tailoring and 2) content category. Posts tailored to SGM young adults, through images, text, or both, were coded as "SGM-tailored" (versus "non-tailored"). For example, a tailored post may have an image of a same-sex couple, a reference to a milestone in SGM history, or a brief discussion of how smoking impacts the SGM community. Non-tailored posts were similar to those used in TSP and were designed for the general young adult population.

Posts were designed according to the U.S. Clinical Practice Guidelines for smoking cessation (Fiore et al., 2008) and Transtheoretical Model strategies (DiClemente et al., 1991). The use of these strategies in post design is described in detail elsewhere (Ramo et al., 2015a). For analyses, posts were divided into four categories based on clinical practice guidelines (Fiore et al., 2008), a published factor analysis of TTM strategies (Prochaska et al., 1988), and relevant study topics. Categories were: motivational interviewing strategies (e.g., decisional balance), experiential TTM strategies (environmental re-evaluation, consciousness-raising, self-reevaluation, social liberation), behavioral TTM strategies (stimulus control, counter-conditioning, reinforcement management, self-liberation, helping relationships), and relevant topics (e-cigarettes, smoking in the LGBT community). Posts were categorized by the first and second authors, with 85.5% agreement. Coders discussed discrepancies until consensus was reached.

2.6. Intervention measures

2.6.1. Acceptability

All comments were downloaded from the Facebook groups for coding. Development of a coding scheme is described below.

2.6.2. Engagement

Engagement with each post was measured using standardized comment volume. Posts were divided into quartiles based on when they were presented to participants (weeks 1–4). The number of comments on each post was standardized within the context of its quartile. This was done to account for order effects, because engagement is likely to decrease over time (Thrul et al., 2015).

2.7. Follow-up measures

2.7.1. Acceptability

At the end of the 30-day study, participants rated their agreement with 8 statements about the Facebook posts in general (1 = *strongly disagree*, 4 = *strongly agree*). Sample items include, "The posts were easy to understand", "The posts have helped me to be healthier", and "I have thought about what I read in the posts" (Ramo et al., 2015b). Responses were dichotomized into agreement ("agree" or "strongly agree") and disagreement ("disagree" or "strongly disagree") for descriptive analyses.

2.7.2. Engagement

Each participant's number of comments was tallied by research staff at the end of the intervention. At follow-up, participants self-reported how many of the 90 posts they had viewed (none, some, about half, most, or all) (Thrul et al., 2015).

2.8. Analyses

2.8.1. Data coding

A coding scheme was developed to determine which posts should be flagged for change or deletion. The investigative team first discussed what information participant comments were likely to yield and what would be most useful in revising the intervention content. Two coders developed an initial coding scheme by independently examining approximately 20% of the Facebook comment content. The coding scheme was iteratively revised during weekly team meetings. Next, one of the initial coders used the coding scheme to calculate relevant quantitative data (e.g., tallying number of comments and number of participants commenting on each post) and to summarize participant feedback. For example, the coder would note if several participants had trouble reading the font (a frequent, minor concern) or if a participant noted that the celebrity in the photo had made derogatory or offensive comments (a major concern). The coder flagged posts for change or deletion if they had frequent or significant negative feedback. Final decisions to flag or not flag posts were made by the three-person team.

Coding of Facebook comments produced both quantitative and qualitative data. Quantitative data for each post included: 1) the number of content-relevant responses, 2) number of comments, and 3) number of participants who commented. The number of comments was used in the calculation of standardized comment volume. Qualitative data included: 1) content-relevant responses (i.e., did participants provide on-topic responses to the post's prompt?), 2) content-relevant feedback (i.e., did participants like and understand the content of the post?), and 3) design-relevant feedback (i.e., did participants suggest changing the font, image, or other aspect of the post design?).

2.8.2. Flags for change

Posts were coded as "flagged for change" or "not flagged for change". Differences in flags for change between tailoring categories (SGM-tailored or non-tailored) and content categories (stage-matched or not matched) were assessed using two chi-square tests for independence. Examples of participant feedback on SGM-tailored posts that were and were not flagged for change or deletion are presented in Supplemental Table 1.

2.8.3. Comment volume

Differences in comment volume between tailored and non-tailored posts were assessed using an independent-samples *t*-test. Differences in comment volume between content categories were assessed using a one-way ANOVA.

3. Results

Participant characteristics are presented in Table 1.

3.1. Acceptability

Overall, the majority of participants ($N = 27$) perceived the intervention positively. Agreement with the statements provided ranged from 54.2% ("I have referred to the links in the posts") to 91.7% ("I have thought about what I read in the posts"). Agreement was highest for statements involving thinking about the posts, and lowest for those involving direct action (e.g., clicking on links, using the information provided). The majority of participants commented regularly (81% commented at least once; M comments per person = 51.74, $SD = 39.61$; skewness = −0.39, kurtosis = −1.82), and viewed all or most of the intervention content. Participants did not report difficulty in navigating Facebook or any of its features. Full results are presented in Table 2.

3.2. Standardized comment volume and flags for change by tailoring and content category

There were no significant differences in flags for change across tailored and non-tailored posts (33% flagged in each category). Although non-tailored posts had a slightly higher comment volume ($M = 8.25$) than tailored posts ($M = 7.96$), this difference was not

Table 1
Participant characteristics ($N = 27$).

	M (SD)/%
Gender identity[a]	
Male	22.2%
Female	40.7%
Genderqueer/NC/NB[b]	37.0%
Trans male/man	7.4%
Trans female/woman	0%
Sex at birth	
Male	22.2%
Female	77.8%
Sexual orientation[a]	
Lesbian/Gay (homosexual)	22.2%
Bisexual	55.6%
Queer	7.4%
Pansexual	29.6%
Relationship status	
Single	40.7%
Dating someone or in a relationship	59.3%
Race[a]	
White/Caucasian	74.1%
Black/African American	14.8%
Asian	3.7%
Hispanic	14.8%
American Indian/Alaskan Native	7.4%
Pacific Islander/Hawaiian Native	3.7%
Arab, non-White	3.7%
Age	19.7 (1.4)
Years of education	13.2 (1.4)
Employment (% employed)	51.8%
FTCD score	1.4 (1.3)
Cigarettes per day	5.4 (3.8)
Daily smoking	48%
Age of first cigarette	15.4 (2.3)
Readiness to quit (baseline)	
Not ready	55.6%
Getting ready	44.4%

[a] Participants could select all responses that apply and percentages may not sum to 100.
[b] Genderqueer, NC ("non-conforming") and NB ("non-binary") refer to participants who do not identify as a male/man or female/woman.

Table 2
Engagement in and perceptions of the intervention at follow-up ($N = 24$).

	% agree or strongly agree
The posts were easy to understand.	87.5
I believe the posts gave sound advice.	87.5
The posts have helped me to be healthier.	75.0
I have used the information.	79.2
I would recommend this program to others.	83.3
I have referred to the links in the posts.	54.2
The posts gave me something new to think about.	83.3
I have thought about what I read in the posts.	91.7

Engagement	%/M (SD)
Comments per person	51.74 (39.61)
Posts viewed	
None	0
Some	0
About half	16.7
Most	16.7
All	66.7

statistically significant. Similarly, there were no significant differences in flags for change across content categories, which ranged from 20% of posts flagged ("topics" category) to 41% flagged ("experiential TTM strategies" category). Likewise, there were no significant differences in comment volume between content categories, which ranged from $M = 6.18$ comments per post (behavioral TTM strategies) to $M = 9.49$ (motivational interviewing strategies). Comments per post were approximately normally distributed (skewness = −0.10, kurtosis = −0.75). Full results are presented in Table 3.

4. Discussion

This study used a mixed-methods approach to test the acceptability of an SGM-tailored Facebook smoking cessation intervention. Overall, participants perceived the intervention positively. Perceptions of the POP intervention were more positive than those measured in feasibility testing of TSP, with a greater proportion of participants indicating that they agreed or strongly agreed with every item (Ramo et al., 2015b). The volume and richness of comments on the Facebook posts in this acceptability testing study suggest that participants in a randomized controlled trial of POP are likely to be engaged in the intervention content. Agreement was lowest for statements involving referring to the links in the posts, helping participants to be healthier, and using the information. These items required active steps beyond simply thinking about the intervention content. Although the majority of participants did endorse them, improvements could be made in helping participants use the information. Further follow-up may be needed to encourage accountability for using the information outside the context of the Facebook group. For example, participants could be encouraged to try a new skill (e.g., coping strategy, assertiveness in social smoking situations) during a specific timeframe and describe their experience to the group. Follow-up may encourage participants to fully take advantage of evidence-based strategies such as developing coping skills and arranging social support (Fiore et al., 2008).

Engagement in the intervention was generally high. All participants reported that they had viewed at least half of the posts in the intervention, the majority reported viewing all of the posts, and average comments per person were high ($M = 52$ of 90 posts). This indicates that most participants' perceptions of the intervention were based on fairly comprehensive exposure to the intervention content. Taken together, it appears that most participants were consistently, actively engaging with the intervention content on Facebook. This is consistent with our group's prior mixed-methods research demonstrating high interest in a digital smoking cessation intervention delivered on Facebook among young adults (Ramo et al., 2015c). Engagement may be further enhanced by the inclusion of "super-users" (i.e., group members who frequently engage with the intervention content) to model engagement for other users. The inclusion of super-users would harness Facebook's ability to facilitate social modeling (Pagoto et al., 2017). Our current clinical trial, comparing the tailored and non-tailored interventions, will be sufficiently powered to examine patterns of engagement over time.

No significant differences were observed between SGM-tailored and non-tailored posts. This was consistent with a systematic review on face-to-face smoking cessation interventions, suggesting that non-tailored interventions—if accessed—are equally effective for SGMs as non-SGMs (Lee et al., 2014), as well as recent findings suggesting the same with a digital intervention (Vogel et al., 2019). However, tailored digital interventions for smoking cessation have generally been shown to be particularly well-received (Sloan et al., 2017; Ferron et al., 2011; McDaniel et al., 2002; Duffy et al., 2013), and a recent study found that a face-to-face tailored smoking cessation intervention had higher acceptability than its non-tailored version (Matthews et al., 2018). Nonetheless, to our knowledge, this is the first acceptability study in the area of digital smoking cessation interventions that directly compares responses to SGM-tailored and non-tailored intervention content at the level of individual Facebook posts. Moreover, the tailored content in this study was new, while the non-tailored content had already been used in the Tobacco Status Project (Ramo et al., 2015a; Ramo et al., 2018b). Following revision, tailored content may be more engaging and better-received than the non-tailored content. We are currently comparing the tailored POP and non-tailored TSP interventions in a clinical

Table 3
Differences in comment volume and proportion of posts flagged for change by SGM tailoring and content category.

	Descriptives		Flags for change				Comments per post[b]				
	N	%	*N*	%	X^2	*p*	*M* Z-score	*M*	*SD*	*t/F*	*p*
SGM tailoring											
Tailored	104	58%	34	33%	0.001	0.977	0.01	7.96	2.58		
Non-tailored	76	42%	25	33%			−0.02	8.25	2.60	−0.19	0.846
Content category[a]											
MI	35	19%	13	37%			−0.01	9.49	2.16		
Experiential	64	36%	26	41%			0.13	9.13	2.20		
Behavioral	61	34%	16	26%			−0.04	6.18	2.16		
Topics	20	11%	4	20%	4.76	0.190	−0.27	8.10	2.22	0.91	0.436
Total	180	100%	59								

[a] "MI" = motivational interviewing strategies, "experiential" = TTM experiential strategies, "behavioral" = TTM behavioral strategies, "topics" = other relevant topics (smoking in the SGM community, e-cigarettes).
[b] Posts were divided into 4 groups based on when they were posted during usability test (weeks 1–4). Z-scores for the number of comments on each post were calculated using the mean number of comments in the post's quartile.

trial of SGM young adult smokers.

Similarly, no significant differences in standardized comment volume or flags for change were observed across content categories. This finding suggests that using a variety of posts was sufficient to keep participants engaged in the intervention. Participants were approximately equally engaged with posts that used traditional smoking cessation counseling strategies as with those that directly address popular topics. These strategies appear to have been adequately adapted for delivery to SGM young adults on a social media platform.

4.1. Implications

Results have implications for designing SGM-tailored and social media-based smoking cessation interventions. First, through an iterative process of coding scheme development, we identified important pieces of information that aid in intervention revision (e.g., content-related feedback, number of comments, design-related feedback). This coding scheme is not specific to the POP intervention and may be useful in the development of other SGM-tailored digital interventions. Second, results suggest that it may not be necessary to tailor every aspect of an intervention to the SGM community. We did not find significant differences in comment volume or flags for change between tailored and non-tailored posts. If this finding is replicated in other studies, it implies that researchers may not need to devote extensive time and resources to adapting every piece of intervention content to a target population. Third, across several studies (Ramo et al., 2018a; Ramo et al., 2015b; Ramo et al., 2018b) we found social media to be an engaging, usable platform for young adult smokers. Content could be adapted for delivery on another social media platform (e.g., Instagram, Twitter) to accommodate changes in the popularity of various platforms.

4.2. Limitations

Strengths of this study include its mixed-methods approach, its ability to track engagement and responses over time, its basis in formative work that was also conducted on social media (Ramo et al., 2018a), and its inclusion of smokers who varied in readiness to quit. This study also had several notable limitations. First, while we were mostly successful in recruiting participants with diverse gender identities and sexual orientations, no participants identified as transwomen, and the majority identified as Caucasian. On several posts, participants commented that they would like to see more racial and gender diversity represented in the intervention content, and these comments were taken into account when flagging posts for change or deletion. However, additional perspectives would be informative. Second, as previously mentioned, the majority of posts were tailored and stage-matched. While this was important from a design perspective, it may have limited our ability to detect differences in flags for change and comment volume between groups. Further research is needed to identify specific intervention strategies and tailoring strategies that are most engaging among SGM young adult smokers. Third, social media interventions carry some risk of privacy loss (Arigo et al., 2018). Indeed, SGM participants in the focus groups conducted prior to this study reported concerns about their social networks discovering their SGM identity or smoking status; however, these concerns were assuaged by the use of entirely private Facebook groups (Ramo et al., 2018), and the risk of privacy loss was highlighted in the study consent form. Finally, we could not examine in differences in engagement or acceptability of the intervention content by participant subgroup (e.g., sexual orientations, gender identities, readiness to quit smoking) due to the small sample size. In this study, we recruited a small number of participants from various facets of the SGM community to examine widespread acceptability of the intervention. We plan to examine differences in treatment engagement and outcomes in an adequately powered clinical trial in the next phase of research.

5. Conclusion

The purpose of this study was to acceptability test smoking cessation intervention content tailored to SGM young adults. Overall, the intervention content was well-received and successful in engaging SGM young adults in a smoking cessation intervention delivered on Facebook. Moreover, this study demonstrates the utility of a social media platform for acceptability testing intervention content with SGM young adults. Social media can be used to present intervention content to participants and gain valuable input to inform further refinement of an intervention.

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Declaration of interest

Dr. Prochaska has provided consultation to pharmaceutical and technology companies that make medications and other treatments for quitting smoking and has served as an expert witness in lawsuits against the tobacco companies. Dr. Ramo has provided consultation to Carrot, Inc., which makes a tobacco cessation device. All other authors have no conflicts of interest to disclose.

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